

WHAT IS CLAIMED IS:

1. A labyrinth seal for a steam turbine having a stationary housing through which extends a rotating element, wherein the steam turbine includes steam flow regions of differential pressure, the labyrinth seal comprising:

5 a seal ring comprising a plurality of adjacent seal segments adapted to be attached to the stationary housing;

a plurality of axially spaced-apart seal fins supported by the plurality of seal segments, wherein each one of the plurality of seal fins extends radially inwardly toward the rotating element, at least two of the plurality of seal fins defining a fin groove therein;

10 and

a flow dam disposed within the fin groove and extending radially inwardly toward the rotating element.

2. The labyrinth seal of claim 1 wherein at least one of the plurality of seal segments defines a segment groove therein, and wherein the fin groove is aligned with the segment groove, and wherein the flow dam is disposed within the segment groove and the aligned fin groove.

3. The labyrinth seal of claim 2 wherein the flow dam is retained within the segment groove by one or more of peening, caulking or frictional forces.

4. The labyrinth seal of claim 1 wherein the flow dam is oriented perpendicular to the plurality of seal fins.

5. The labyrinth seal of claim 1 further comprising a fin groove defined in each one of the plurality of seal fins, and wherein the flow dam is disposed within the fin grooves.

6. The labyrinth seal of claim 1 further comprising a plurality of fin grooves defined in each one of the plurality of seal fins, and a like plurality of flow dams, wherein a one of the plurality of flow dams is disposed within each one of the plurality of fin grooves.

7. The labyrinth seal of claim 6 wherein the plurality of fin grooves comprises a plurality of aligned fin grooves, such that the plurality of flow dams are substantially parallel when disposed within each one of the plurality of fin grooves.

8. The labyrinth seal of claim 1 wherein the rotating element comprises a rotating shaft.

9. The labyrinth seal of claim 1 wherein a radial height of the plurality of seal fins is greater than a radial height of the flow dam.

10. The labyrinth seal of claim 1 further comprising a plurality of conditioning vanes supported by the plurality of seal segments and axially spaced apart from the plurality of seal fins.

11. A labyrinth seal for a steam turbine having a stationary housing through which extends a rotating element, wherein the steam turbine includes steam flow regions of differential pressure, the labyrinth seal comprising:

a seal ring comprising a plurality of N adjacent seal segments adapted to be attached to the stationary housing; and

at least $N + 1$ flow dams supported by one of the seal segments.

12. A labyrinth seal for a steam turbine having a stationary housing through which extends a rotating element, wherein the steam turbine includes steam flow regions of differential pressure, the labyrinth seal comprising:

a seal ring comprising a plurality of N adjacent seal segments adapted to be attached to the stationary housing;

a plurality of axially spaced-apart seal fins supported by the plurality of seal segments, wherein each one of the plurality of seal fins extends radially inwardly toward the rotating element, the plurality of seal fins defining at least $N + 1$ fin grooves therein; and

a flow dam disposed within the at least $N + 1$ fin grooves and extending radially inwardly toward the rotating element.

13. A method for reducing circumferential steam flow in a steam turbine having a stationary housing through which extends a rotating element, wherein the steam turbine includes steam flow regions of differential pressure, the method comprising:

forming a plurality of axially spaced-apart circumferential seal fins extending radially inwardly toward the rotating element;

forming a fin groove in each one of the seal fins; and

disposing a flow dam within the fin grooves, wherein the flow dam extends radially inwardly toward the rotating element.

14. The method of claim 13 wherein the flow dam is oriented perpendicular to the plurality of seal fins.

15. The method of claim 13 wherein the step of forming a fin groove further comprises forming a plurality of fin grooves in each one of the plurality of seal fins, and
5 wherein the step of disposing a flow dam further comprises disposing one of a like plurality of flow dams in a groove in each one of the plurality of seal fins.